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(54) **PRINTING UNIT FOR WATER-BASED INKS**

**DRUCKWERK FÜR DRUCKFARBEN AUF WASSERBASIS
GROUPE IMPRIMANT POUR ENCRE A L'EAU**

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EP 0 886 577 B1

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DescriptionField of the Invention

5 [0001] The present invention relates to a printing unit for using water based inks in high speed rotary printing presses.

Background of the Invention

10 [0002] U.S. Patent Nos. 5,309,838, and 5,375,518 each purport to disclose a system for keeping the printing plates of a printing press at a moderate temperature. A cooling air blower girder extends longitudinally over the printing plate surface and blows cold air onto the printing plate's surfaces in order to keep its temperature of a desired value. The blast air girder contains at least one heat exchanger and at least one blower as well as at least one air return duct, which together forms a cooling air cycle, through which the air blown onto the printing plate surface is returned to the air inlet of the heat exchanger and optionally mixed with fresh air blown by the blower once again through the heat exchanger onto the printing plate surface. The blast air girder purportedly presents an energy saving compact structural unit for keeping the printing plate surface at a moderate temperature.

15 [0003] U.S. Patent No. 5,452,657 purportedly relates to a temperature control system for printing press cylinders. It contains at least one compressed air line having at least one blast air opening for blowing cold air against a cylinder which is to be cooled. At least one recirculation circuit which is separate from the cold air of the compressed air line and by which air which has been blown by the blast air opening onto the cylinder is drawn off by means of a blower contained in the circulation circuit and is blown parallel to the cold air again onto the cylinder. In this way, the temperature of the cold air can be active, without prior change of temperature on the cylinder. The cold air deflected by the cylinder is returned to the cylinder for additional cooling.

20 [0004] U.S. Patent No. 5,098,478 relates to water based ink compositions. The water based ink composition comprises water, a pigment, a non-ionic surfactant having a solubility in water of less than about 0.5 wt % and a solubilizing agent sufficient to solubilize substantially all of the none-ionic surfactant.

25 [0005] U.S. Patent No. 5,026,755 purports to disclose a water based printing ink prepared from polyamid/acrylic graft copolymers. It is prepared by reacting the polyamid with the acrylic monomer or monomers in an alcohol solution in the presence of a free radical peroxidic initiator. The graft copolymer purports to be particularly useful as the resin component of a water based printing ink.

30 [0006] Finally, German laid open patent application DE 41 19 348 A1 purports to disclose a method for offset printing and a printing unit for waterless offset printing. A conventional offset plate is used with a water based printing ink, containing a pigment, water, 5-50 % water soluble macromolecular binding agents, a hygroscopic organic fluid and preferably a multivalent alcohol.

35 Summary of the Invention

[0007] In accordance with the present invention, a printing unit is provided for printing with water-based inks. Such water-based inks provide many advantages over conventional inks, but have proven difficult to use in an offset printing unit. Preferably, the present invention uses a water-based ink which is free of volatile organic components (VOCs). VOCs, such as hydrocarbons, are conventionally evaporated from inks in long driers. As a result, VOC-free water-based inks dry cleaner, with little or no air pollution. Moreover, since these water-based inks have no VOCs to evaporate, they require less temperature to dry. This, in turn, allows a reduction in the length of the driers. Finally, with the use of water-based inks with no VOCs, alternative drying mechanisms such as infra red or micro-wave drying are possible in offset presses. However, it has been found that water-based inks are difficult to use in offset printing because the ink is highly sensitive to temperature and humidity variations, and tends to dry prematurely.

40 [0008] In accordance with the present invention, a printing unit for printing with water based inks includes a blanket cylinder for supporting a printing blanket, a print cylinder for supporting a print form, and an inking unit for applying a water-based ink over the print form. The printing blanket, print form, and inking unit each have respective ink carrying surfaces for transferring the water-based ink. A cooling unit is mounted within the printing unit for maintaining the outer ink carrying surface of one or more of the print form, printing blanket, and inking unit at a predetermined level. Since heating and cooling above the dew point will not result in condensation, the predetermined temperature level is preferably set above the dew point of the atmosphere surrounding the ink carrying surfaces to prevent condensation of the water in the atmosphere onto the ink carrying surfaces. Moreover, in accordance with a preferred embodiment of the invention, the predetermined temperature level is set just slightly above the dew point so that evaporation of water from the ink is minimized while still preventing condensation.

55 [0009] In accordance with another embodiment of the present invention, the cooling unit includes a blanket cylinder cooling unit coupled to the blanket cylinder for circulating a first cooling agent through the blanket cylinder. In addition,

a blanket temperature sensor is mounted within the printing unit for monitoring the temperature at the outer ink carrying surface of the printing blanket, and a control unit is provided which has an input connected to the blanket temperature sensor, and an output connected to the blanket cylinder cooling unit. The control unit monitors the temperature at the outer ink carrying surface of the printing blanket via the blanket temperature sensors, and controls the temperature at the outer ink carrying surface of the printing blanket by controlling the temperature of the first cooling agent.

[0010] In accordance with another embodiment of the present invention, the cooling unit may include a print cylinder cooling unit alone or in combination with the blanket cylinder cooling unit described above. The print cylinder cooling unit is coupled to the print cylinder for circulating a second cooling agent through the print cylinder. A print form temperature sensor is mounted within the printing unit for monitoring the temperature at the outer ink carrying surface of the print form, and the control unit has an input connected to the print form temperature sensor, and an output connected to the print cylinder cooling unit. The control unit monitors the temperature at the outer ink carrying surface of the print form via the print form temperature sensor, and controls the temperature at the outer ink carrying surface of the print form by controlling the temperature of the second cooling agent.

[0011] In addition, the cooling unit may also include inker cooling unit alone or in combination with the print cylinder and blanket cylinder cooling units described above. The inker cooling unit is coupled to one or more of a plurality of rollers within the inking unit (e.g., vibrator rollers) and circulates a third cooling agent through these rollers. A inking unit temperature sensor is mounted within the printing unit for monitoring the temperature at the outer ink carrying surface of the rollers, and the control unit has an input connected to the inking unit temperature sensor, and an output connected to the inker cooling unit. The control unit monitors the temperature at the outer ink carrying surface of the rollers via the inking unit temperature sensor, and controls the temperature at the outer ink carrying surface of the rollers by controlling the temperature of the third cooling agent.

[0012] In accordance with a further embodiment of the present invention, an air blower is mounted within the printing unit for circulating and conditioning the atmosphere surrounding the blanket cylinder, print cylinder, and/or inking unit. While the air blower may be used independently from the cooling unit, in accordance with a preferred embodiment of the present invention, the air blower is used in combination with the cooling unit described above.

Brief Description of the Drawings

[0013]

Fig. 1 shows a printing unit in accordance with an embodiment of the present invention.

Fig. 2(a-c) show illustrative flow charts for the control unit of Fig. 1

Fig. 3 shows a further embodiment of the printing unit of Fig. 1

Fig. 3(a) shows an illustrative flow chart for the control unit of Fig. 3

Fig. 4, 4(a) show devices for controlling a temperature of the side walls of a printing unit.

Fig. 5 shows the blanket cylinder of Fig. 1 in more detail.

Detailed Description of the Invention

[0014] Fig. 1 shows a printing unit 1 in accordance with the present invention. The printing unit 1 includes side walls 2 supporting upper and lower inking units 55.1, 55.2, blanket cylinders 4,6 and print cylinders 3,5. The upper inking unit 55.1 includes a fountain roller 50.1 and metering roller 51 which apply an ink film to distributor rollers 52, and to vibrator rollers 9, 10 and 11 for splitting the ink film and providing an even ink profile over the width of the printing unit. The vibrator rollers 10, 11 distribute the ink film to a group of upper form rollers 16. The upper form rollers 16, in turn, apply the ink film to a print form 70.1 mounted on the upper print cylinder 3. Similarly, the vibrator rollers 13, 14 distribute the ink film to a group of lower form rollers 17, and the lower form rollers 17 apply the ink film to a print form 70.2 mounted on the lower print cylinder 5.

[0015] The print form 70 may be constructed as a flat plate mounted by its respective ends to the print cylinder, as a sleeve-shaped print form mounted axially over the print cylinder, or in any other known manner. In any case, the print form 70 is suitable for receiving and transferring an image using water based inks. For example, it has been found that "waterless" type printing plates, such as those manufactured by Toray Industries, are also suitable for printing with water based inks. As an example, a Toray Industries printing plate having an aluminum oxide substrate with an image area coated with a photopolymer whose surface is hydrophilic in nature and a non-image area coated with a silicone polymer

may be used.

[0016] An illustrative water-based ink for use with the present invention may include the components set forth below. The water phase of the ink is supplied by the water present in the acrylic resin latex, hydroxypropyl cellulose, hydroxyethyl ethylene urea, and the maleated rosin ester.

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Component	Amount, wt. %
Styrene/maleic anhydride resin	12
Phthalocyanine Blue pigment	12
Acrylic resin latex (50 % wt. % solids)	5
Hydroxypropylcellulose (3% wt. % solids)	10
Hydroxyethylethylene urea (70% wt % solids)	8
Monoethanol amine	2
Polyethylene Wax	2
Ethoxylated acetylenic diol surfactant	2
Maleated rosin ester (50 wt. % solids)	47
Total	100

[0017] The printing unit 1 is designed to maintain acceptable printing conditions for printing with water based inks through the use of one or more cooling units. Referring to Fig. 1, a print cylinder cooling unit 7 is assigned to the upper and lower print cylinders 3, 5. The print cylinder cooling unit 7 includes a print cylinder inlet pipe 7.1 and a print cylinder outlet pipe 7.2 for each of the print cylinders 3, 5. A lower print cylinder sensor 19.2 is arranged near the lower print cylinder 5, and an upper print cylinder sensor 19.1 is arranged near the upper print cylinder 3. A pair of relative humidity sensors 60.1, 60.2 are mounted within the printing unit 1 to measure the relative humidity of the atmosphere in the upper print unit section 1.1 and lower printing unit section 1.2, and a pair of temperature sensors 60.3, 60.4 are mounted within the printing unit 1 to measure the temperature of the atmosphere in the upper print unit section 1.1 and lower printing unit section 1.2. A control unit 18 has respective inputs connected to the print cylinder sensors 19.1, 19.2, the relative humidity and temperature sensors 60.1, 60.2, 60.3, 60.4 and an output connected to the cooling unit 7. The control unit 18 periodically monitors the temperature of the print cylinders 3,5 via the sensors 19.1, 19.2, and of the atmosphere with the relative humidity sensors 60.1, 60.2 and temperature sensors 60.3, 60.4, and then controls the print cylinder cooling unit 7 as a function of the monitored temperature values.

[0018] The print cylinder sensors 19.1, 19.2 can be constructed, for example, as infra-red sensors mounted adjacent to the print cylinders 3,5 to monitor the surface temperature of the print cylinders. The cooling unit 7 continuously circulates a cooling agent (e.g. water or air) through the print cylinders 3, 5 via the print cylinder inlet and outlet pipes 7.1, 7.2. By controlling the temperature of the cooling agent via the controlling device 18, the temperature of the cylinders 3, 5 can be maintained at a predetermined level (e.g., at a setpoint or within a predetermined range). The predetermined level is preferably set slightly above the dew point of the atmosphere surrounding the ink carrying surfaces of the print cylinders in order to prevent condensation of water from the atmosphere onto the ink carrying surfaces, and to minimize evaporation of water from the water-based inks into the atmosphere.

[0019] The predetermined level can be set as follows based upon the sensor readings. Relative humidity (RH) is a function of the amount of water per volume of air which is actually present in the atmosphere (VA) and the amount of water per volume of air which is necessary to saturate the air (VS): $VA/VS \times 100 = RH$. VS, in turn, is a function of the temperature of the atmosphere: $VS = f(t)$. Since the temperature of the atmosphere is known from sensors 60.3, 60.4, and the relative humidity of the atmosphere is known from sensors 60.1, and 60.2, VA and VS for the temperature of the atmosphere surrounding the ink carrying surfaces are readily determined by the control unit 18. Therefore, in order to maintain the temperature of the ink carrying surfaces above the dew point, the control unit can assume VA to remain constant, and choose a predetermined temperature level for the cylinders 3, 5 which has a corresponding VS which is slightly greater than VA.

[0020] The upper and lower blanket cylinders 4, 6 have printing blankets 71.1, 71.2 mounted thereon for transferring an inked image from the print forms 70.1, 70.2 to a web of material 22 as shown in Fig. 3. The printing blanket 71 may be constructed as a flat blanket mounted by its respective ends to the blanket cylinder, as a gapless tubular printing blanket mounted axially over the blanket cylinder, or in any other known manner.

[0021] A blanket cylinder cooling unit 8 is assigned to the upper and lower blanket cylinders 4, 6. The blanket cylinder cooling unit 8 includes a blanket cylinder inlet 8.1 and a blanket cylinder outlet 8.2 for each blanket cylinder. A lower blanket cylinder sensor 20.2 is arranged near the lower blanket cylinder 6, and an upper blanket cylinder sensor 20.1 is arranged near the upper blanket cylinder 4. The control unit 18 has respective inputs connected to the blanket cylinder sensors 20.1, 20.2 and an output connected to the cooling unit 8. The control unit 18 periodically monitors the temperature of the blanket cylinders 4, 6 via the sensors 20.1, 20.2, and then controls the blanket cylinder cooling unit 8 as a function of the monitored temperature values as described above with regard to the print cylinders. The sensors 20 and cooling unit 8 can be constructed and controlled in the same manner as the sensors 19 and cooling unit 7.

[0022] An ink cooling unit 15 is assigned to the upper vibrator rollers 9, 10, 11, the lower vibrator rollers 12, 13 and 14, and the upper and lower fountain rollers 50.1, 50.2 respectively. The cooling unit 15 includes an upper section 15.1 assigned to the upper inker 55.1 and a lower section 15.2 assigned to the lower inker 55.2. An ink inlet pipe 15.3 and outlet pipe 15.4 is connected to each roller 9-14, 50.1, 50.2. A respective ink sensor 21.1, 21.2 is assigned to each inking unit 55.1, 55.2. In the configuration of Fig. 1, sensor 21.1 senses the temperature at an outer ink carrying surface of roller 11, and sensor 21.2 senses the temperature at an outer ink carrying surface of roller 14. The control unit 18 has respective inputs connected to the ink sensors 21.1, 21.2 and an output connected to the ink cooling unit 15. The control unit 18 periodically monitors the temperature of the vibrator rollers 11, 14 via the sensors 20.1, 20.2, and then controls the ink cooling unit 15 as a function of the monitored temperature values as described above with regard to the print cylinders. The sensors 21 and cooling unit 15 can be constructed and controlled in the same manner as the sensors 19 and cooling unit 7.

[0023] Figures 2(a-c) show an illustrative flow chart for the control unit 18. Referring to Fig. 2a, the control unit monitors the surface temperature of the upper blanket (T_{b1}) and of the lower blanket (T_{b2}) via the sensors 20.1, 20.2. If an average of these sensor readings is above a set point, then the control unit 18 lowers the temperature of the cooling agent in the blanket cooling unit 8 by an amount X , waits a time period T , and then monitors the outputs of the sensors 20.1, 20.2 again. These steps are repeated until the average of the sensor readings is equal to the set point. Similarly, if the average of these sensor readings is below the set point, then the control unit 18 raises the temperature of the cooling agent in the blanket cooling unit 8 by an amount X , waits a time period T , monitors the outputs of the sensors 20.1, 20.2 again, and repeats these steps until the average of the sensor readings is equal to the set point. As illustrated in Figs. 2b and 2c, the control unit monitors and controls the temperature of the print cylinders 3, 5 and inker rollers 9-14, 50.1, 50.2 in the same manner. Preferably, the setpoint is set slightly above the dew point of the atmosphere surrounding the print cylinders, blanket cylinders, and inking unit. In this manner, the relative humidity of the atmosphere surrounding the ink carrying surfaces of the inking unit, blanket cylinders, and print cylinders will be high enough to prevent any significant evaporation of water from the ink, but low enough to prevent condensation of water from the atmosphere onto the ink carrying surfaces. The set point can be obtained based upon the monitored values of the sensors 60.1 through 60.4 as described above.

[0024] It should be noted that since the temperature of the cylinders and rollers in the printing unit 1 tend to rise naturally due to the heat generated from the operation of the press, it is possible to eliminate steps 130 and 135 in the flow charts of Figs. 2a through 2c, and to rely instead on the natural tendency of the temperature of the cylinders and rollers to rise over time. In such an embodiment, the cooling units 7, 8, and 15 need not include means for heating the cooling agent. Moreover, the above referenced flow charts are merely illustrative, and could be replaced with any suitable algorithm known in the art for matching a measured value to a desired value.

[0025] In the embodiment shown in Figs. 1 and 2, separate sensors 19.1, 19.2 are provided for the upper and lower print cylinders 3, 5, and the temperature of the cooling agent applied to both cylinders is a function of the average of the two sensor readings. However, it is also possible to control the temperature of the cooling agent as a function of the temperature measured at only one of the cylinders (3 or 5) by one sensor (19.1 or 19.2). Similarly, a single temperature sensor (60.3 or 60.4) and humidity sensor (60.1 or 60.2) could be used. In such an embodiment, the temperature of the cooling agent circulated within both print cylinders will be a function of the temperature measured at the ink carrying surface of only one of the cylinders (3 or 5). The sensor pairs 20.1, 20.2 and 21.1, 21.2 could likewise be replaced with single sensors measuring the temperature at one of the blanket cylinders (4 or 6) and at one of the inking units (55.1 or 55.2).

[0026] Moreover, it is also possible to provide separate cooling units for some or all of the cylinders 3, 4, 5, 6 and rollers 9, 10, 11, 12, 13, 14 50.1, 50.2 and to control the temperature of the cooling agent applied to these cylinders and rollers individually via the control unit as a function of separate sensors.

[0027] In order to provide acceptable conditions for printing with water based inks, the temperature of the ink and of the surfaces the ink is applied to should be maintained at certain predetermined levels. For example, in a water based ink containing 2% ethanol amine or ammonia, if the temperature of the print cylinders is maintained between 33-35 [93-95 degrees] and 75-95 % humidity, high print quality can be maintained. Naturally, these levels are merely illustrative, and may vary in accordance with a number of factors including the particular construction of the printing unit, the particular composition of the water based ink, and the paper being used. In accordance with the present invention, the tem-

perature of the cylinders 3-6 and rollers 9-14 are monitored by the control unit, and is maintained within the desired temperature range (or at a desired set point) by selectively controlling the temperature of the cooling agent flowing through these cylinders and rollers.

[0028] For example, when a printing press is first started, the printing unit components 3-6, 9-14, 50.1, 50.2 will be relatively cold. Therefore, the control unit 18, by monitoring the temperature sensors 19-21, will determine that the temperature on the ink carrying surfaces of the blanket cylinders 4, 6, print cylinders 3,5, and vibrator rollers 11, 14 is below the desired temperature level for the water based ink and paper being used. The control unit 18 will then advise the press operator to pre-heat the printing unit 1 prior to printing. Such a preheating could be accomplished by running the press while off impression until the temperature of the blanket cylinders 4, 6, print cylinders 3,5, and vibrator rollers 11, 14 has reached the desired level. Alternatively, the control unit 18 could raise the temperature of the cooling agent in the blanket cylinder cooling unit 8, the print cylinder cooling unit 7, and the inker cooling unit 15 until the temperature of the blanket cylinders 4, 6, print cylinders 3,5, and vibrator rollers 11, 14 has reached the desired level.

[0029] In contrast, after the printing press has been printing for a period of time, the temperature on the ink carrying surfaces of one or more of the blankets, print forms or rollers (70, 71, 9-14, 50.1, 50.2) within the printing unit 1 may rise above the desired temperature level. The control unit 18, by monitoring the temperature sensors 19-21, will detect that the temperature on the ink carrying surfaces of the blankets, print forms, and/or vibrator rollers (71.1, 71.2, 70.1, 70.2, 11, and/or 14) is above the desired temperature level for the water based ink and paper being used, and will then lower the temperature of the cooling agent in the respective cooling units (7,8, and/or 15) as necessary until the temperature of the blankets, print forms, and/or vibrator rollers has reached the desired level.

[0030] Fig. 3 shows a further embodiment of the printing unit of Fig. 1. The pipes 7.1, 7.2, 8.1, 8.2, 15.3, 15.4 and sensors 19-21 have been omitted for ease of illustration. In accordance with this embodiment, blowing sections 23.1, 23.2 are mounted within the printing unit 1, and connected to a blowing unit 23 via an air inlet pipe 24.1 and an air exhaust pipe 24.2. The blowing unit 23 includes an air cooling mechanism and an air heating mechanism, and is coupled to and controlled by the control unit 18 to maintain the temperature of the water based ink carrying surfaces of the blanket cylinders 4, 6 at the set point. The blowing devices 23.1 and 23.2 each include outputs 80 to blow air onto the surfaces of the blanket cylinder 4, 6 carrying the water based ink films. The blowing devices 23.1 and 23.2 also include suction inputs 81 for sucking the atmosphere surrounding the water based ink carrying surfaces out through the air exhaust pipe 24.2. In this manner, the water based ink carrying surfaces of the blanket are cooled or heated from the outside via the blowing unit 23, and from the inside via the cooling units 8.

[0031] Referring to Fig. 3A, the control unit 18 monitors the surface temperature of the upper blanket cylinder (T_{b1}) and of the lower blanket cylinder (T_{b2}) via the sensors 20.1, 20.2. If an average of these sensor readings is above the set point, then the control unit 18 lowers the temperature of the air output from the air inlet 24.1 by an amount X, waits a time period T, and then monitors the outputs of the sensors 20.1, 20.2 again. These steps are repeated until the average of the sensor readings is equal to the set point. Similarly, if the average of these sensor readings is below the set point, then the control unit 18 raises the temperature of the air output from the air inlet 24.1 by an amount X, waits a time period T, monitors the outputs of the sensors 20.1, 20.2 again, and repeats these steps until the average of the sensor readings is equal to the set point. The heating and/or cooling of the air by the blowing device 23 can be accomplished inside or outside the blowing devices 23.1, 23.2. Moreover, in accordance with a further embodiment of the present invention, the blowing devices 23.1, 23.2 could be arranged within the printing unit 1 to blow air on both the print cylinders 3,5 and the blanket cylinders 4,6.

[0032] As discussed above with regard to Figs. 2(a-c), since the temperature of the cylinders and rollers in the printing unit 1 tends to rise naturally due to the heat generated from the operation of the press, it is possible to eliminate steps 130 and 135 in the flow charts of Fig. 3a, and to rely instead on the natural tendency of the temperature of the cylinders and rollers to rise over time. In such an embodiment, the air heating mechanism can be omitted from the blowing device 23. In addition, the above referenced flow chart is merely illustrative, and could be replaced with any suitable algorithm known in the art for marching a measured value to a desired value.

[0033] In accordance with another embodiment of the present invention, the blowing unit 23 includes a humidifier 255 which is controlled by the control unit 18 and supplied by water supply lines 250.1, 250.2. The humidifier 255 may be arranged within the blowing unit 23, within the blowing devices 23.1, 23.2, in between the blowing unit 23 and blowing devices 23.1, 23.2, or in any other suitable location. If the control unit 18 determines that the monitored relative humidity is below a humidity set point, it will activate the humidifier until the monitored humidity is equal to the humidity set point. By maintaining the humidity of the atmosphere surrounding the ink carrying surfaces at the humidity setpoint (e.g. between 75% and 95% relative humidity), evaporation of water from the water-based ink can be minimized while still preventing condensation of water into the ink. Moreover, by controlling the humidity within the atmosphere surrounding the print and/or blanket cylinders, the temperature set point can be set at a static value (e.g., 33-35°C [93-95 degrees Fahrenheit]).

[0034] Fig. 4 shows a temperature controlling device in accordance with the present invention for maintaining an even temperature profile across the printing unit 1. The sidewalls 2 include a gear-side wall 2.1 and a work-side wall 2.2. Dur-

ing press operation, the gear-side wall 2.1, which houses the gears which drive the cylinders and/or rollers in the printing unit 1, tends to become significantly hotter than the work-side wall 2.2. Consequently, it is advantageous to cool the gear-side wall 2.1 to provide an even temperature profile over the width of said printing unit 1.

[0035] In accordance with the present invention, a gear-side temperature sensor 26 is mounted on the gear-side wall 2.1 and a work-side temperature sensor 28 is mounted on the work-side wall 2.2. Each of the temperature sensors 26, 28 is connected to the control unit 18. A friction reducing fluid such as mineral oil or synthetic oil is conventionally provided within a gear box 32 of the gear-side wall 2.1 to lubricate the moving parts within the gear-side wall 2.1. A fluid distribution 82 is provided for circulating the friction reducing fluid to and from a heat exchanger 29. The heat exchanger 29 may be of conventional construction, and operates to cool the fluid in the fluid distribution 82 by, for example, inter-twining the fluid distribution 82 with a fluid pipe 62 containing a cooling fluid such as water. The control unit 18 monitors the temperature of the work-side and gear-side walls 2.2, 2.1 via the sensors and controls a fluid cooling unit 61 as a function of the monitored temperatures. The control unit 18, via the fluid cooling unit 61, adjusts the temperature of the cooling fluid within the fluid pipe 62 in order to maintain a temperature differential between the values measured at sensors 26 and 28 within a certain setpoint range (e.g. $|T_{26} - T_{28}| \leq 7^{\circ}\text{C}$ [7 degrees Fahrenheit]).

[0036] In the above embodiment, it is anticipated that the design of the work-side frame components is such that the temperature of the work-side frame at 27 does remains within approximately 10 degrees Fahrenheit of the ambient temperature of the surrounding atmosphere. If, however, the work-side frame exceeds the ambient temperature by more than 10 degrees Fahrenheit, it may be necessary to provide a work-side cooling mechanism for the work side frame 2.2. Referring to Fig. 4(a), the cooling mechanism, could, for example, include a cooling unit 99 which circulates a cooling agent through pipes 98 which are mounted to the work-side frame 2.2. The cooling unit 99 could monitor the ambient temperature of the air surrounding the work-side frame 2.2 via a temperature sensor 27, monitor the temperature of the work-side frame 2.2 via the sensor 28, and lower the temperature of the cooling agent if the difference between the monitored values exceed 10°C [10 degrees Fahrenheit].

[0037] Fig. 5 shows a longitudinal section of one of the blanket cylinders 4, 6. The blanket cylinder 4, 6 includes the blanket cylinder inlet 8.1 and a blanket cylinder outlet 8.2 for circulating the cooling agent through the blanket cylinder. In addition, the blanket cylinder includes a compressed air inlet 36 which transmits compressed air across the length of the cylinder and out a plurality of apparatus 38 along the surface of the blanket cylinder in order to axially install and remove a printing blanket. In accordance with a preferred embodiment of the present invention, the air inlet 36 is isolated from the cooling agent circulating within the cylinder 33. The cooling agent can be circulated through the print cylinder 3, 5, and rollers 9 - 14 in a similar manner.

List of Reference Numerals

[0038]

35	1	printing unit
	1.1	upper printing unit section
	1.2	lower printing unit section
	2	side wall
40	2.1	gear side
	2.2	work side
	3	printing cylinder
	4	blanket cylinder
	5	print cylinder
45	6	blanket cylinder
	7	print cylinder cooling unit
	7.1	print cylinder inlet pipe
	7.2	print cylinder outlet pipe
	8	blanket cylinder cooling unit
50	8.1	blanket cylinder inlet
	8.2	blanket cylinder outlet
	9	upper vibrator roller
	10	upper vibrator roller
	11	upper vibrator roller
55	12	lower vibrator roller
	13	lower vibrator roller
	14	lower vibrator roller
	15	cooling unit

	15.1	upper section
	15.2	lower section
	15.3	inker inlet pipe
	15.4	inker outlet pipe
5	16	upper form rollers
	17	lower form rollers
	18	control unit
	19	temperature sensors
	19.1	print cylinder sensor
10	19.2	print cylinder sensor
	20	temperature sensors
	20.1	upper blanket cylinder sensor
	20.2	lower cylinder sensor
	21	temperature sensors
15	21.1	inker sensor
	21.2	inker sensor
	22	web
	23	blowing unit
	23.1	blowing section
20	23.2	blowing section
	24	-----
	24.1	air inlet pipe
	24.2	air exhaust pipe
	25	-----
25	26	gear side temperature sensor
	27	temperature sensor
	28	work side temperature sensor
	29	heat exchanger
	30	-----
30	31	-----
	32	gearbox
	33	cylinder
	34	gear side
	35	work side
35	36	compressed air inlet
	37	-----
	38	apertures
	39	bearings
	40	air chamber
40	41	-----
	42	ring
	43	compression sleeve
	44	plug
	45	compression bolt
45	46	bore
	47	bore
	48	supply
	49	-----
	50.1	fountain roller
50	50.2	fountain roller
	51	metering roller
	52	distributor roller
	55.1	upper inking unit
	55.2	lower inking unit
55	60.1	relative humidity sensor
	60.2	relative humidity sensor
	60.3	temperature sensor
	60.4	temperature sensor

61	temperature control unit
62	fluid pipe
70.1	print form
70.2	print form
5 71.1	printing blanket
71.2	printing blanket
80	output
81	suction input
82	fluid distribution
10 98	pipe
99	cooling unit
130	step in flow chart
135	step in flow chart
250.1	water supply line
15 250.2	water supply line
255	humidifier

Claims

20 1. A printing unit for a rotary printing presses including ,

a print cylinder (3, 5) for supporting a print form (70.1, 70.2) suitable for printing with water based inks, the print form (70.1, 70.1) having an outer ink carry surface;

25 an inking (55.1, 55.2) unit for applying water based ink to the print form (70.1, 70.2), the inking unit (55.1, 55.2) having an outer ink carrying surface;

a blanket cylinder (4, 6) for supporting a printing blanket (71.1, 71.2), the printing blanket (71.1, 71.2) having an outer ink carrying surface; and

30 a cooling unit (7, 8, 15) for maintaining a temperature of the ink carrying surface of one or more of the print form (70.1, 70.2), the inking unit (55.1, 55.2) and the printing blanket (71.1, 71.2) at a predetermined level which is above a dew point of an atmosphere surrounding the outer ink carrying surfaces, the cooling unit including a print cylinder cooling unit (7) coupled to the print cylinder (3, 5), the print cylinder cooling unit (7) circulating a first cooling agent through the print cylinder (3, 5) to maintain the outer ink carrying surface of the print form (70.1, 70.2) at the predetermined level.

2. The printing unit according to claim 1,
wherein the cooling unit includes a blanket cylinder cooling unit (8) coupled to the blanket cylinder (4, 6) the blanket
40 cylinder cooling unit (8) circulating a second cooling agent through the blanket cylinder (4, 6) to maintain the outer ink carrying surface of the printing blanket (4, 6) at the predetermined level.

3. The printing unit according to claim 1,
wherein the inking unit (55.1, 55.2) further includes a vibrator roller (11) having an outer ink carrying surface; and
45 wherein the cooling unit includes a vibrator roller cooling unit (15) coupled to the vibrator roller (11) the vibrator roller cooling unit (15) circulating a second cooling agent through the vibrator roller (11) to maintain the outer ink carrying surface of the vibrator roller (11) at the predetermined level.

4. The printing unit according to claim 3,
50 wherein the inking unit includes a plurality of vibrator rollers (9, 10, 11, 12, 13, 14).

5. The printing unit according to claim 3,
wherein the inking unit (55.1, 55.2) includes a fountain roller (50.1, 50.2) having an outer ink carrying surface; and
55 wherein the vibrator roller inking unit (15) is coupled to the fountain roller (50.1, 50.2), the vibrator rolling cooling unit (15) circulating a third cooling agent through the fountain roller (50.1, 50.2) to maintain the outer ink carrying surface of the fountain roller (50.1, 50.2) at the predetermined level.

6. The printing unit according to claim 1, further comprising

- a temperature sensor (60.3, 60.4) mounted within the printing unit (1),
 a control unit (18) having an input coupled to the temperature sensor (60.3, 60.4) and
 an output connected to the cooling unit (7, 8, 15), the control unit (18) controlling the cooling unit (7, 8, 15) as
 a function of a temperature value received from the temperature sensor (60.3, 60.4).
- 5
7. The printing unit according to claim 1, further comprising
- a print form temperature sensor (19.1, 19.2) mounted within the printing unit (1),
 a control unit (18) having an input coupled to the print form temperature sensor (19.1, 19.2) and an output con-
 nected to the print cylinder cooling unit (7) to control unit (18) controlling a temperature of the first cooling agent
 as a function of a print form temperature value received from the print form temperature sensor (19.1, 19.2).
- 10
8. The printing unit according to claim 2, further comprising
- a blanket temperature sensor (20.1, 20.1) mounted within the printing unit (1), a control unit (18) having an
 input coupled to the blanket temperature sensor (20. 1, 20.2) and an output connected to the blanket cylinder
 cooling unit (8) , the control unit (18) controlling an temperature of the second cooling agent as a function of
 the blanket temperature value received from the blanket temperature sensor (20.1, 20.2).
- 15
9. The printing unit according to claim 2, further comprising
- a vibrator temperature sensor (21.1, 21.2) mounted within the printed unit (1), a control unit (18) having an
 input coupled to the vibrator temperature sensor (21.1, 21.2) in an output connected to the vibrator roller cool-
 ing unit (15), the control unit (18) controlling a temperature of the second cooling agent as a function of the
 vibrator temperature value received from the vibrator temperature sensor (21.1, 21.2)
- 20
10. The printing unit according to claim 1, further comprising
- an air blower (23.1, 23.2) mounted within the printing unit (1) the air blower (23.1, 23.2) having an air intake
 (24.1) for blowing air into an atmosphere round the blanket cylinder (4, 6) and an air exhaust (24.2) for sucking
 air out of the atmosphere round the blanket cylinder (4, 6).
- 25
11. The printing unit according to claim 10, further comprising
- a blanket temperature sensor (21.1, 21.2) for monitoring a blanket temperature level of the printing blankets
 (71.1, 71.2),
 a control unit (18) having an input connected to the blanket temperature sensor (21.1, 21.2) and having outputs
 connected to the air blower (23.1, 23.2) and the cooling unit (8), the control unit (18) controlling the air blower
 (23.2, 23.3) and cooling unit (8) as a function of the blanket temperature level received from the blanket tem-
 perature sensor (21.1, 21.2).
- 30
12. The printing unit according to claim 11,
 wherein the air blower (23.1, 23.2) further includes an air cooling mechanism:
- 35
13. The printing unit according to claim 12,
 wherein the air blower (23.2, 23.2) further includes a humidifier (255).
- 40
14. The printing unit according to claim 11,
 wherein the air blower (23.1, 23.2) further includes a fan and an air heating mechanism.
- 45
15. The printing unit according to claim 1,
 wherein the cooling unit (7, 8, 15) circulates an agent through one or more of the print cylinder (3, 5), the blanket
 cylinder (4, 6) and the inking unit (55.1, 55.2).
- 50
16. The printing unit according to claim 15,
 wherein the cooling unit (7, 8, 15) further includes an agent cooling mechanism (99).
- 55

17. The printing unit according to claim 16,
wherein the cooling unit further includes an agent heating mechanism (29).

18. The printing unit according to claim 1, further comprising

5

a gear side wall (2.1) including a gear box (32),
a work side wall (2.2), the blanket cylinder (4, 6) and print cylinder (3, 5) supported for rotation by the gear side
and work side walls (2.1, 2.2),
a first sensor (26) mounted to the gear side walls (2.1) for monitoring a gear side temperature level,
a second sensor (28) mounted to the work side wall (2.2) for monitoring a work side temperature level,
a heat exchanger (29) coupled to the gear box (32) for controlling a temperature of a fluid within the gear box
(32),
a control unit (61) having inputs connected to the first and second sensor (26, 28) and having an output connected to the heat exchanger (29), the control unit (61) actuating the heat exchanger (29) as a function of the
work side and gear side temperature levels.

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19. The printing unit according to claim 18,

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further comprising a temperature sensor (27) for monitoring an ambient temperature level of an atmosphere
surrounding the work side wall (2.2),
a work side cooling mechanism (99) having inputs coupled to the temperature sensor (27) and the second sensor
(28), and an output coupled to the work side wall (2.2), the cooling unit (99) controlling the temperature of
the work side wall (2.1) as a function of the monitored work side temperature level and ambient temperature
level.

25

Patentansprüche

1. Druckwerk für Rotationsdruckmaschinen, welches die folgenden Merkmale umfaßt:

30

einen Druckzylinder (3, 5) mit einer darauf angebrachten Druckform (70.1, 70.2), die für das Drucken mit auf
Wasser basierender Farbe geeignet ist und eine farbführende Außenfläche aufweist;
ein Farbwerk (55.1, 55.2) mit farbführenden Außenflächen, das auf Wasser basierende Farbe auf die Druck-
form (70.1, 70.2) aufträgt;
einen Gummituchzylinder mit einem darauf angebrachten Gummituch (71.1, 71.2), das eine farbführende
Außenfläche aufweist; und
eine Kühleinheit (7, 8, 15), die die Temperatur der farbführenden Außenfläche einer oder mehrerer der Kom-
ponenten, nämlich der Druckform (70.1, 70.2), des Farbwerks (55.1, 55.2) und des Gummituchs (71.1, 71.2)
auf einem vorbestimmten Niveau, das über dem Taupunkt der die farbführende Außenfläche umgebenden
Atmosphäre liegt, aufrechterhält, wobei die Kühleinheit aus einer mit dem Druckzylinder (3, 5) verbundenen
Druckzylinder-Kühleinheit (7) besteht, die ein erstes Kühlmittel durch den Druckzylinder (3, 5) zirkuliert, um die
farbführende Außenfläche der Druckform (70.1, 70.2) auf einem vorbestimmten Temperaturniveau zu halten.

35

40

2. Druckwerk nach Anspruch 1,
dadurch gekennzeichnet,

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daß die Kühleinheit aus einer mit dem Gummituchzylinder (4, 6) verbundenen Gummituchzylinder-Kühleinheit
(8) besteht, die ein zweites Kühlmittel durch den Gummituchzylinder (4, 6) zirkuliert, um die farbführende
Außenfläche des Gummituchs 71.1, 71.2 auf einem vorbestimmten Temperaturniveau zu halten.

50

3. Druckwerk nach Anspruch 1,
dadurch gekennzeichnet,

55

daß das Farbwerk (55.1, 55.2) ferner eine Reibwalze (11) mit einer farbführenden Außenfläche umfaßt; und
daß die Kühleinheit aus einer Reibwalzen-Kühleinheit (15) besteht, die mit der Reibwalze (11) verbunden ist,
und ein zweites Kühlmittel durch die Reibwalze (11) zirkuliert, um die farbführende Außenfläche der Reibwalze
(11) auf einem vorbestimmten Temperaturniveau zu halten.

4. Druckwerk nach Anspruch 3,

dadurch gekennzeichnet,

daß das Farbwerk (55.1, 55.2) eine Vielzahl von Reibwalzen (9, 10, 11, 12, 13, 14) umfaßt.

- 5 5. Druckwerk nach Anspruch 3,
dadurch gekennzeichnet,

daß das Farbwerk (55.1, 55.2) eine Farbkastenwalze (50.1, 50.2) mit einer farbführenden Außenfläche umfaßt; und

- 10 daß die Reibwalzen-Kühleinheit (15) mit der Farbkastenwalze (50.1, 50.2) verbunden ist und ein drittes Kühlmittel durch die Farbkastenwalze (50.1, 50.2) zirkuliert, um die farbführende Außenfläche der Farbkastenwalze (50.1, 50.2) auf einem vorbestimmten Temperaturniveau zu halten.

- 15 6. Druckwerk nach Anspruch 1,
dadurch gekennzeichnet,

daß innerhalb des Druckwerks (1) ein Temperatursensor (60.3, 60.4) und eine Steuereinheit (18) vorgesehen sind,

- 20 daß die Steuereinheit (18) einen mit dem Temperatursensor (60.3, 60.4) verbundenen Input und einen mit der Kühleinheit (7, 8, 15) verbundenen Output aufweist, und
daß die Steuereinheit (18) die Kühleinheit (7, 8, 15) in Abhängigkeit von dem von dem Temperatursensor (60.3, 60.4) angegebenen Temperaturwert steuert.

- 25 7. Druckwerk nach Anspruch 1,
dadurch gekennzeichnet,

daß innerhalb des Druckwerks (1) ein Druckzylinder-Temperatursensor (19.1, 19.2) angebracht ist, und
daß die Steuereinheit (18), die einen mit dem Druckzylinder-Temperatursensor (19.1, 19.2) verbundenen Input und einen mit der Druckzylinder-Kühleinheit (7) verbundenen Output aufweist, die Temperatur des ersten Kühlmittels in Abhängigkeit von einem von dem Druckzylinder-Temperatursensor (19.1, 19.2) angegebenen Temperaturwert steuert.

- 35 8. Druckwerk nach Anspruch 2,
dadurch gekennzeichnet,

daß innerhalb des Druckwerks (1) ein Gummituch-Temperatursensor (20.1, 20.2) angebracht ist, und
daß die Steuereinheit (18), die einen mit dem Gummituch-Temperatursensor (20.1, 20.2) verbundenen Input und einen mit der Gummituchzylinder-Kühleinheit (8) verbundenen Output aufweist, die Temperatur des zweiten Kühlmittels in Abhängigkeit von einem von dem Gummituch-Temperatursensor (20.1, 20.2) angegebenen Temperaturwert steuert.

- 40 9. Druckwerk nach Anspruch 2,
dadurch gekennzeichnet,

45 daß innerhalb des Druckwerks (1) ein Reibwalzen-Temperatursensor (21.1, 21.2) angebracht ist, und
daß die Steuereinheit (18), die einen mit dem Reibwalzen-Temperatursensor (21.1, 21.2) verbundenen Input und einen mit der Farbwerk-Kühleinheit (15) verbundenen Output aufweist, die Temperatur des zweiten Kühlmittels in Abhängigkeit von einem von dem Reibwalzen-Temperatursensor (21.1, 21.2) angegebenen Temperaturwert steuert.

- 50 10. Druckwerk nach Anspruch 1,
dadurch gekennzeichnet,

55 daß innerhalb des Druckwerks (1) eine Blaseinrichtung (23.1, 23.2) vorgesehen ist, die ein Lufteinlaßrohr (24.1), durch das Luft in die den Gummituchzylinder (4, 6) umgebende Atmosphäre geblasen wird, und ein Luftauslaßrohr (24.2), durch das Luft aus der den Gummituchzylinder (4, 6) umgebenden Atmosphäre angesaugt wird, aufweist.

11. Druckwerk nach Anspruch 10,
dadurch gekennzeichnet,

5 daß ein Gummituch-Temperatursensor (20.1, 20.2) zur Überwachung der Temperatur des Gummituchs (71.1, 71.2) vorgesehen ist, und
daß die Steuereinheit (18), die einen mit dem Gummituch-Temperatursensor (20.1, 20.2) verbundenen Input und mit der Blaseinrichtung (23.1, 23.2) und der Gummituchzylinder-Kühleinheit (8) verbundene Outputs aufweist, die Blaseinrichtung (23.1, 23.2) und die Gummituchzylinder-Kühleinheit (8) in Abhängigkeit von einem von dem Gummituch-Temperatursensor (20.1, 20.2) angegebenen Temperaturwert steuert.

12. Druckwerk nach Anspruch 11,
dadurch gekennzeichnet,

15 daß die Blaseinrichtung (23.1, 23.2) einen Luftkühlmechanismus umfaßt.

13. Druckwerk nach Anspruch 12,
dadurch gekennzeichnet,

20 daß die Blaseinrichtung (23.1, 23.2) einen Befeuchter (255) umfaßt.

14. Druckwerk nach Anspruch 11,
dadurch gekennzeichnet,

25 daß die Blaseinrichtung (23.1, 23.2) ein Gebläse und einen Lufterwärmungsmechanismus umfaßt.

15. Druckwerk nach Anspruch 1,
dadurch gekennzeichnet,

30 daß die Kühleinheit (7, 8, 15) ein Kühlmittel durch einen oder mehrere der Komponenten, nämlich den Druckzylinder (3, 5), den Gummituchzylinder (4, 6) und das Farbwerke (55.1, 55.2) zirkuliert.

16. Druckwerk nach Anspruch 15,
dadurch gekennzeichnet,

35 daß die Kühleinheit (7, 8, 15) einen Kühlmittel-Kühlmechanismus (99) umfaßt.

17. Druckwerk nach Anspruch 16,
dadurch gekennzeichnet,

40 daß die Kühleinheit (7, 8, 15) einen Kühlmittel-Erwärmungsmechanismus (29) umfaßt.

18. Druckwerk nach Anspruch 1,
gekennzeichnet durch,

45 eine getriebeseitige Wand (2.1) mit einem Getriebegehäuse (32);
eine bedienerseitige Wand (2.2), wobei der Gummituchzylinder (4, 6) und der Druckzylinder (3, 5) in der getriebeseitigen und der bedienerseitigen Wand (2.1, 2.2) drehbar gelagert sind;
einen an der getriebeseitigen Wand (2.1) angebrachten ersten Sensor (26), um das getriebeseitige Temperaturniveau zu überwachen;
50 einen an der bedienerseitigen Wand (2.2) angebrachten zweiten Sensor (28), um das bedienerseitige Temperaturniveau zu überwachen;
einen Wärmeaustauscher (29), der mit dem Getriebegehäuse (32) verbunden ist, und die Temperatur einer Kühlflüssigkeit in dem Getriebegehäuse (32) zu steuern;
und eine Temperatursteuereinheit (61) mit Inputs, die mit dem ersten und dem zweiten Sensor (26, 28) verbunden sind, und mit einem Output, der mit dem Wärmeaustauscher (29) verbunden ist, wobei die Temperatursteuereinheit (61) den Wärmeaustauscher (29) in Abhängigkeit von dem getriebeseitigen und dem bedienerseitigen Temperaturniveau aktiviert.

19. Druckwerk nach Anspruch 18,
dadurch gekennzeichnet,

5 daß ferner ein Temperatursensor (27) für die Überwachung des Temperaturniveaus der die bedienerseitige Wand (2.2) umgebenden Atmosphäre vorgesehen ist, und eine bedienerseitiger Kühleinheit (99) mit Inputs, die mit dem Temperatursensor (27) und dem zweiten Sensor (28) verbunden sind, und mit einem Output, der mit der bedienerseitigen Wand (2.2) verbunden ist, wobei die Kühleinheit (99) die Temperatur der bedienerseitigen Wand (2.1) in Abhängigkeit von der überwachten bedienerseitigen Temperatur und dem Umgebungstemperaturniveau steuert.

10

Revendications

1. Groupe d'impression pour presses rotatives à imprimer, comprenant

15 un cylindre d'impression (3, 5) destiné à supporter une forme d'impression (70.1, 70.2) qui convient pour effectuer l'impression à l'aide d'encre à base d'eau, la forme d'impression (70.1, 70.2) ayant une surface extérieure porteuse d'encre ;
un mécanisme encreur (55.1, 55.2) destiné à déposer de l'encre à base d'eau sur la forme d'impression (70.1, 70.2) le mécanisme encreur (55.1, 55.2) ayant une surface extérieure porteuse d'encre ;
20 un cylindre de blanchet (4, 6) destiné à supporter un blanchet d'impression (71.1, 71.2), le blanchet d'impression (71.1, 71.2) ayant une surface extérieure porteuse d'encre ; et
un groupe de refroidissement (7, 8, 15) pour maintenir une température de la surface porteuse d'encre d'une ou de plusieurs formes d'impression (70.1, 70.2), du mécanisme encreur (55.1, 55.2) et du blanchet d'impression (71.1, 71.2) à un niveau prédéterminé qui est supérieur à un point de rosée d'une atmosphère entourant
25 les surfaces extérieures porteuses d'encre, le groupe de refroidissement comprenant un groupe de refroidissement (7) du cylindre d'impression, qui est raccordé au cylindre d'impression (3, 5), le groupe de refroidissement (7) du cylindre d'impression faisant circuler un premier agent de refroidissement dans le cylindre d'impression (3, 5) pour maintenir la surface extérieure porteuse d'encre de la forme d'impression (70.1, 70.2) au niveau prédéterminé.

30

2. Groupe d'impression selon la revendication 1, dans lequel le groupe de refroidissement comprend un groupe de refroidissement (8) du cylindre de blanchet, qui est raccordé au cylindre de blanchet (4, 6), le groupe de refroidissement (8) du cylindre de blanchet faisant circuler un deuxième agent de refroidissement dans le cylindre de blanchet (4, 6) pour maintenir la surface extérieure porteuse d'encre du blanchet d'impression (4, 6) au niveau prédéterminé.

35

3. Groupe d'impression selon la revendication 1, dans lequel le mécanisme encreur (55.1, 55.2) comprend par ailleurs un rouleau distributeur (11) ayant une surface extérieure porteuse d'encre ; et
40 dans lequel le groupe de refroidissement comprend un groupe de refroidissement (15) du rouleau distributeur, qui est raccordé au rouleau distributeur (11), le groupe de refroidissement (15) du rouleau distributeur faisant circuler un deuxième agent de refroidissement dans le rouleau distributeur (11) pour maintenir la surface extérieure porteuse d'encre du rouleau distributeur (11) au niveau prédéterminé.

40

45 4. Groupe d'impression selon la revendication 3, dans lequel le mécanisme encreur comprend plusieurs rouleaux distributeurs (9, 10, 11, 12, 13, 14).

45

5. Groupe d'impression selon la revendication 3, dans lequel le mécanisme encreur (55.1, 55.2) comprend un rouleau d'encrier (50.1, 50.2) ayant une surface extérieure porteuse d'encre ; et
50 dans lequel le mécanisme encreur du rouleau distributeur (15) est relié au rouleau d'encrier (50.1, 50.2), le groupe de refroidissement (15) du rouleau distributeur faisant circuler un troisième agent de refroidissement dans le rouleau d'encrier (50.1, 50.2) pour maintenir la surface extérieure porteuse d'encre du rouleau d'encrier (50.1, 50.2) au niveau prédéterminé.

55

6. Groupe d'impression selon la revendication 1, comprenant par ailleurs

un capteur de température (60.3, 60.4) monté dans le groupe d'impression (1).

un dispositif de commande (18) ayant une entrée connectée au capteur de température (60.3, 60.4) et une sortie raccordée au groupe de refroidissement (7, 8, 15), le dispositif de commande (18) commandant le groupe de refroidissement (7, 8, 15) en fonction d'une valeur de température reçue du capteur de température (60.3, 60.4).

5

7. Groupe d'impression selon la revendication 1, comprenant par ailleurs

10

un capteur (19.1, 19.2) de la température de la forme d'impression qui est monté dans le groupe d'impression (1), un dispositif de commande (18) ayant une entrée connectée au capteur de température (19.1, 19.2) de la forme d'impression et une sortie raccordée au groupe de refroidissement (7) du cylindre d'impression de manière que le dispositif de commande (18) commande une température du premier agent de refroidissement en fonction d'une valeur de température de la forme d'impression reçue du capteur de température (19.1, 19.2) de la forme d'impression.

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8. Groupe d'impression selon la revendication 2, comprenant par ailleurs

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un capteur (20.1, 20.2) de la température du blanchet qui est monté dans le groupe d'impression (1), un dispositif de commande (18) ayant une entrée connectée au capteur (20.1, 20.2) de la température du blanchet et une sortie raccordée au groupe de refroidissement (8) du cylindre de blanchet, le dispositif de commande (18) commandant une température du deuxième agent de refroidissement en fonction de la valeur de la température du blanchet reçue du capteur (20.1, 20.2) de la température du blanchet.

9. Groupe d'impression selon la revendication 2, comprenant par ailleurs

25

un capteur (21.1, 21.2) de la température du distributeur qui est monté dans le groupe d'impression (1), un dispositif de commande (18) ayant une entrée connectée au capteur (21.1, 21.2) de la température du distributeur et une sortie raccordée au groupe de refroidissement (15) du rouleau distributeur, le dispositif de commande (18) commandant une température du deuxième agent de refroidissement en fonction de la valeur de température du distributeur reçue du capteur (21.1, 21.2) de la température du distributeur.

30

10. Groupe d'impression selon la revendication 1, comprenant par ailleurs

35

une soufflante d'air (23.1, 23.2) montée dans le groupe d'impression (1), la soufflante d'air (23.1, 23.2) ayant une admission d'air (24.1) pour insuffler de l'air dans une atmosphère entourant le cylindre de blanchet (4, 6) et une évacuation d'air (24.2) pour aspirer l'air afin de le faire sortir de l'atmosphère entourant le cylindre de blanchet (4, 6).

11. Groupe d'impression selon la revendication 10, comprenant par ailleurs

40

un capteur (21.1, 21.2) de la température du blanchet pour contrôler un niveau de température de blanchet des blanchets d'impression (71.1, 71.2), un dispositif de commande (18) ayant une entrée connectée au capteur (21.1, 21.2) de température de blanchet et ayant des sorties raccordées à la soufflante d'air (23.1, 23.2) et au groupe de refroidissement (8), le dispositif de commande (18) commandant la soufflante d'air (23.2, 23.3) et le groupe de refroidissement (8) en fonction du niveau de température de blanchet reçu du capteur (21.1, 21.2) de la température des blanchets.

45

12. Groupe d'impression selon la revendication 11,

dans lequel la soufflante d'air (23.1, 23.2) comprend par ailleurs un appareil de refroidissement d'air.

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13. Groupe d'impression selon la revendication 11,

dans lequel la soufflante d'air (23.2, 23.2) comprend par ailleurs un humidificateur (255).

14. Groupe d'impression selon la revendication 11,

dans lequel la soufflante d'air (23.1, 23.2) comprend par ailleurs un ventilateur et un appareil de chauffage d'air.

55

15. Groupe d'impression selon la revendication 1,

dans lequel le groupe de refroidissement (7, 8, 15) fait circuler un agent dans un ou plusieurs du cylindre d'impression (3, 5), du cylindre de blanchet (4, 6) et du mécanisme encreur (55.1, 55.2).

16. Groupe d'impression selon la revendication 15,
dans lequel le groupe de refroidissement (7, 8, 15) comprend par ailleurs un appareil (99) de refroidissement de
l'agent.
- 5 17. Groupe d'impression selon la revendication 16,
dans lequel le groupe de refroidissement comprend par ailleurs un appareil de chauffage de l'agent (19).
18. Groupe d'impression selon la revendication 1, comprenant par ailleurs
- 10 une paroi (2.1) côté engrenage incluant un carter d'engrenage (32).
une paroi côté travail (2.2), le cylindre de blanchet (4, 6) et le cylindre d'impression (3, 5) étant supportés à
rotation par les parois côté engrenage et côté travail (2.1, 2.2).
un premier capteur (26) monté dans les parois côté engrenage (2.1) pour contrôler un niveau de température
côté engrenage,
- 15 un deuxième capteur (28) monté sur la paroi coté travail (2.2) pour contrôler un niveau de température côté
travail,
un échangeur de chaleur (29) raccordé au carter d'engrenage (32) pour commander une température d'un
fluide situé dans le carter d'engrenage (32),
un dispositif de commande (61) ayant des entrées connectées aux premier et deuxième capteurs (26, 28) et
20 ayant une sortie raccordée à l'échangeur de chaleur (29), le dispositif de commande (61) faisant fonctionner
l'échangeur de chaleur (29) en fonction des niveaux de température côté travail et côté engrenage.
19. Groupe d'impression selon la revendication 18, comprenant par ailleurs
- 25 un capteur de température (27) pour contrôler un niveau de température ambiante d'une atmosphère entou-
rant la paroi côté travail (2.2),
un appareil (99) de refroidissement du côté travail ayant des entrées raccordées au capteur de température
(27) et au deuxième capteur (28), ainsi qu'une sortie raccordée à la paroi (2.2) côté travail, le groupe de refroi-
dissement (99) commandant la température de la paroi côté travail (2.2) en fonction du niveau de température
30 contrôlé côté travail et du niveau de température ambiante.

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Fig.1

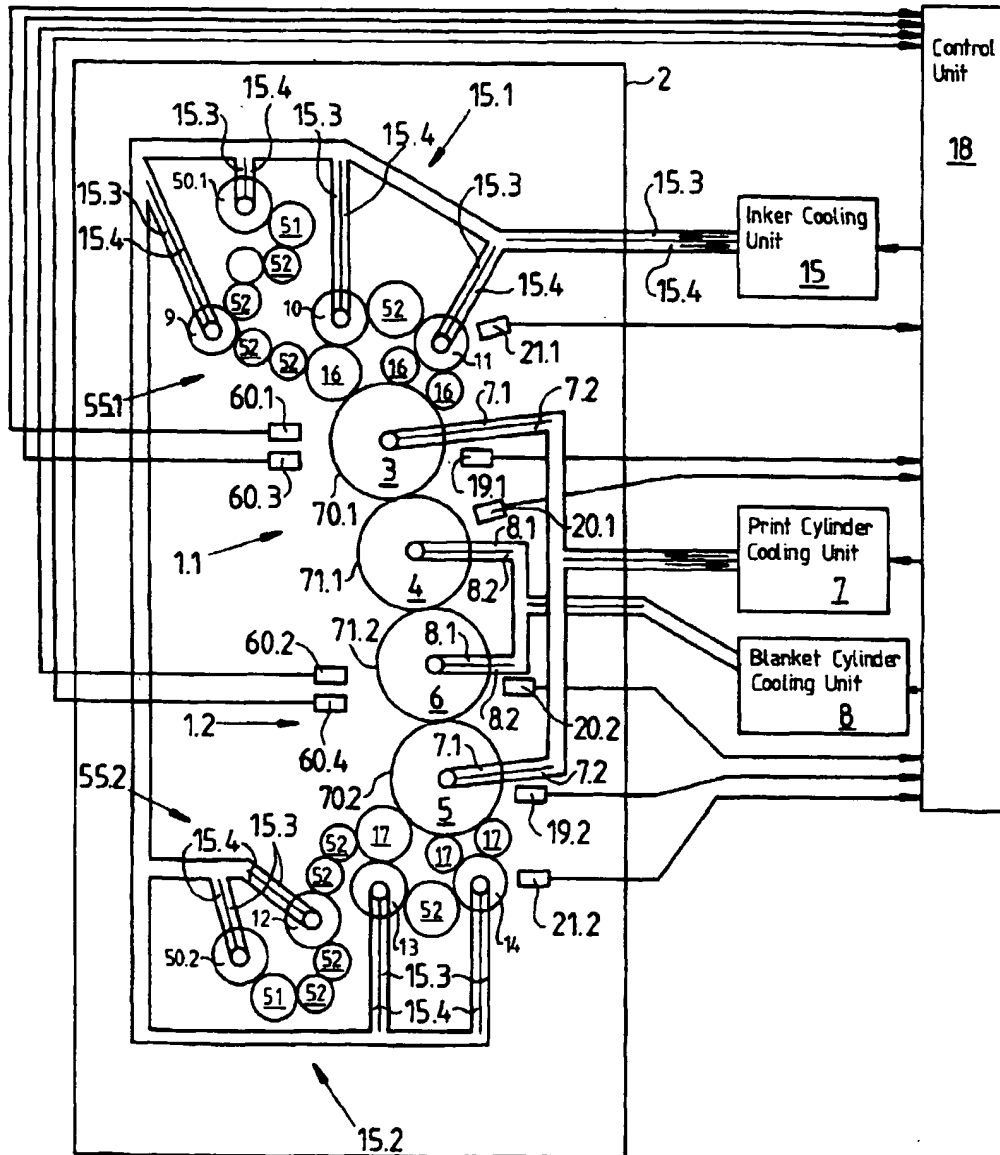


Fig.2a

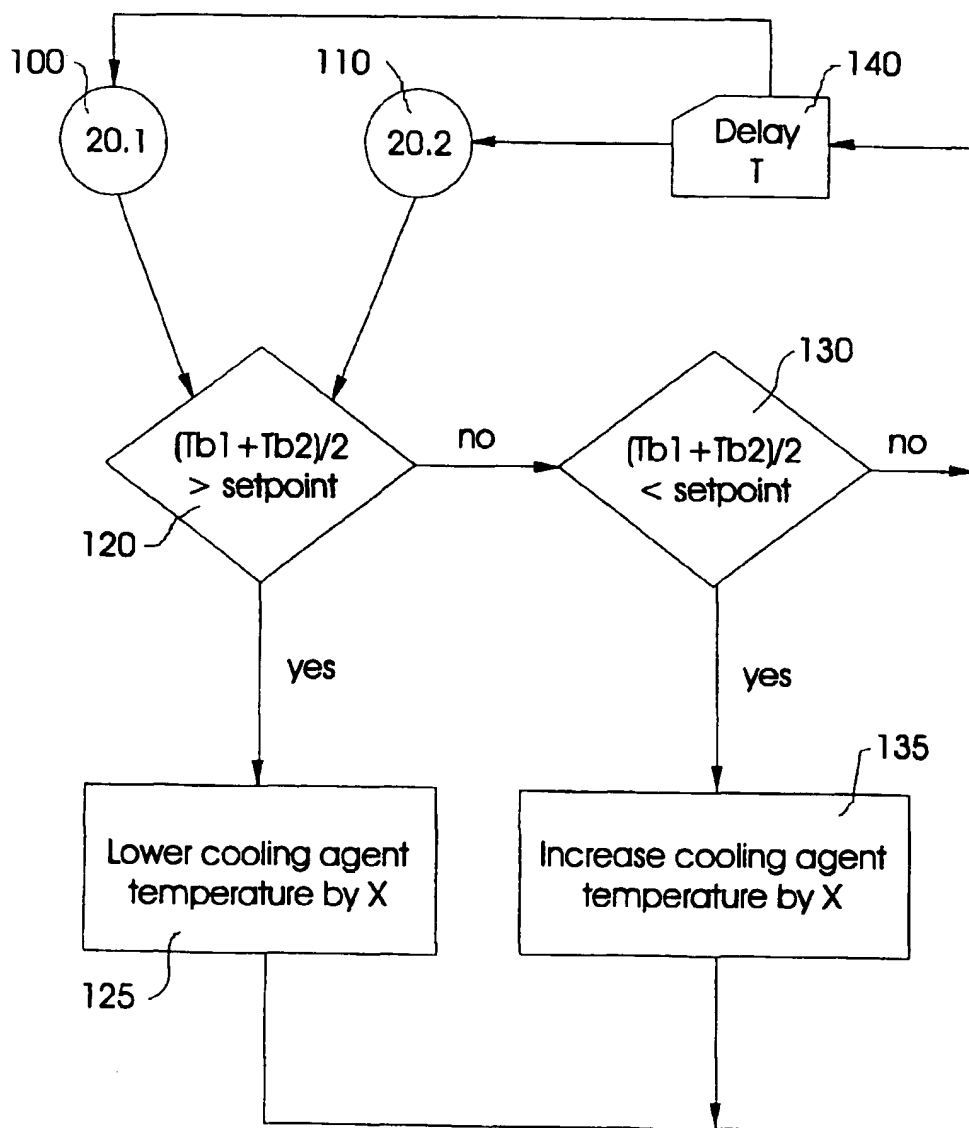


Fig.2b

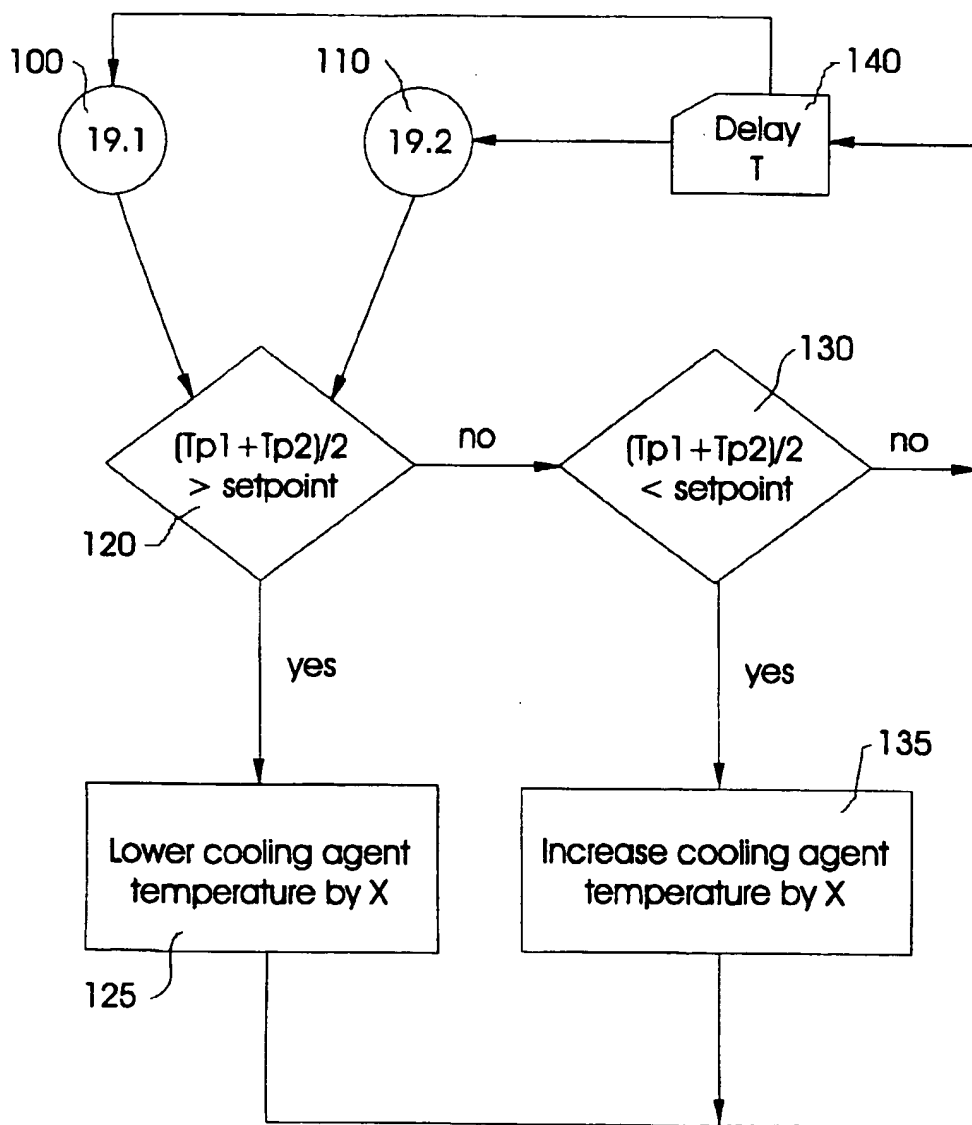


Fig.2c

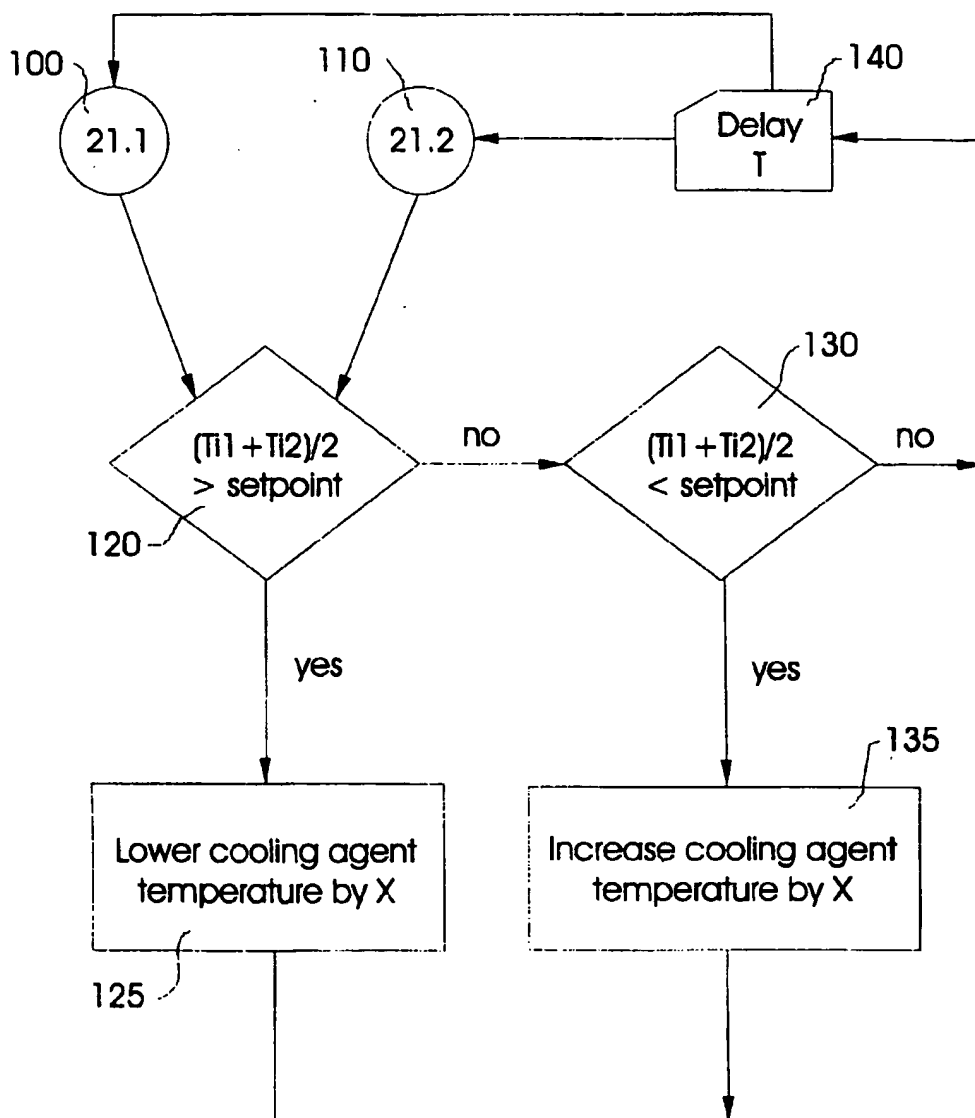


Fig.3

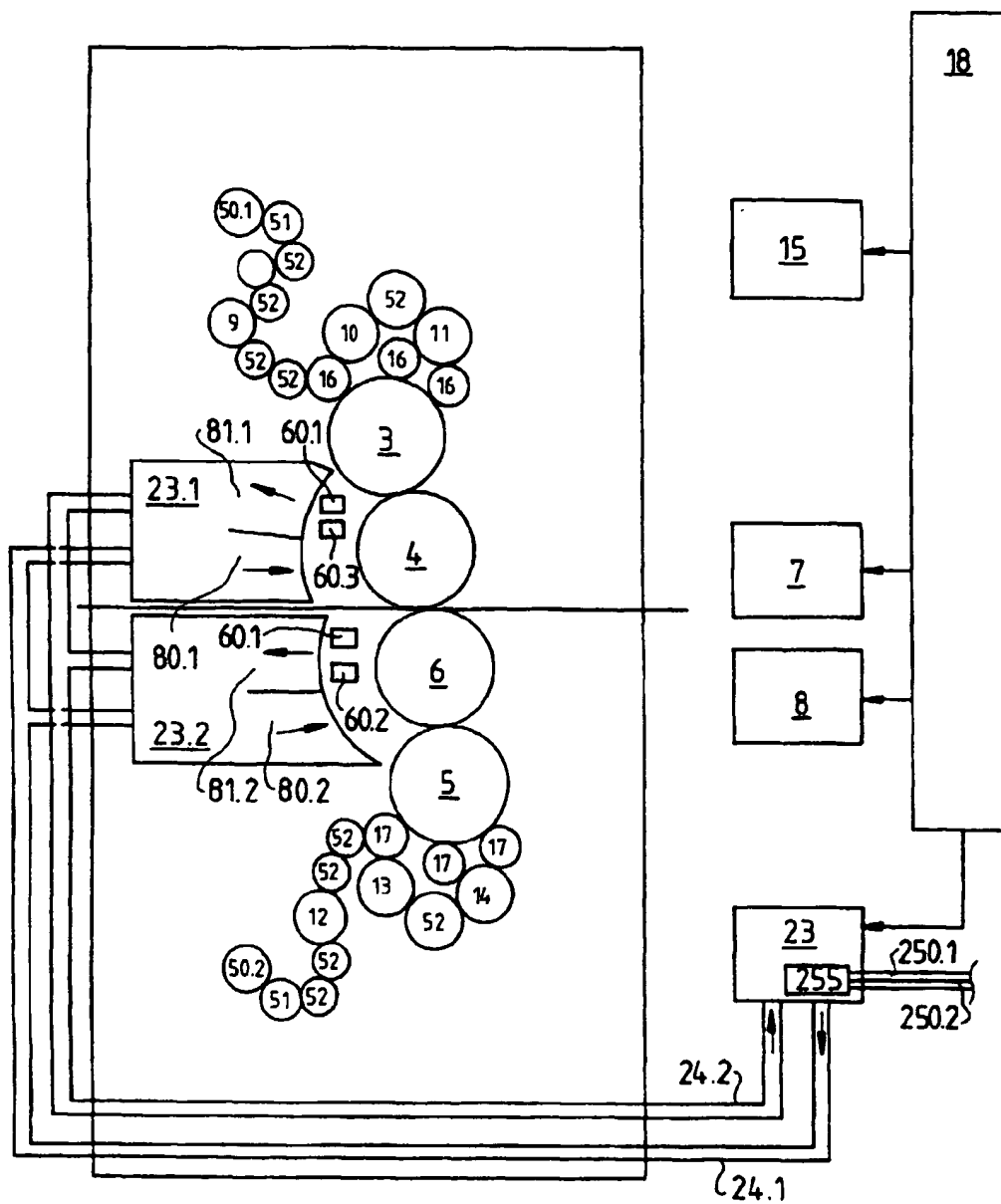
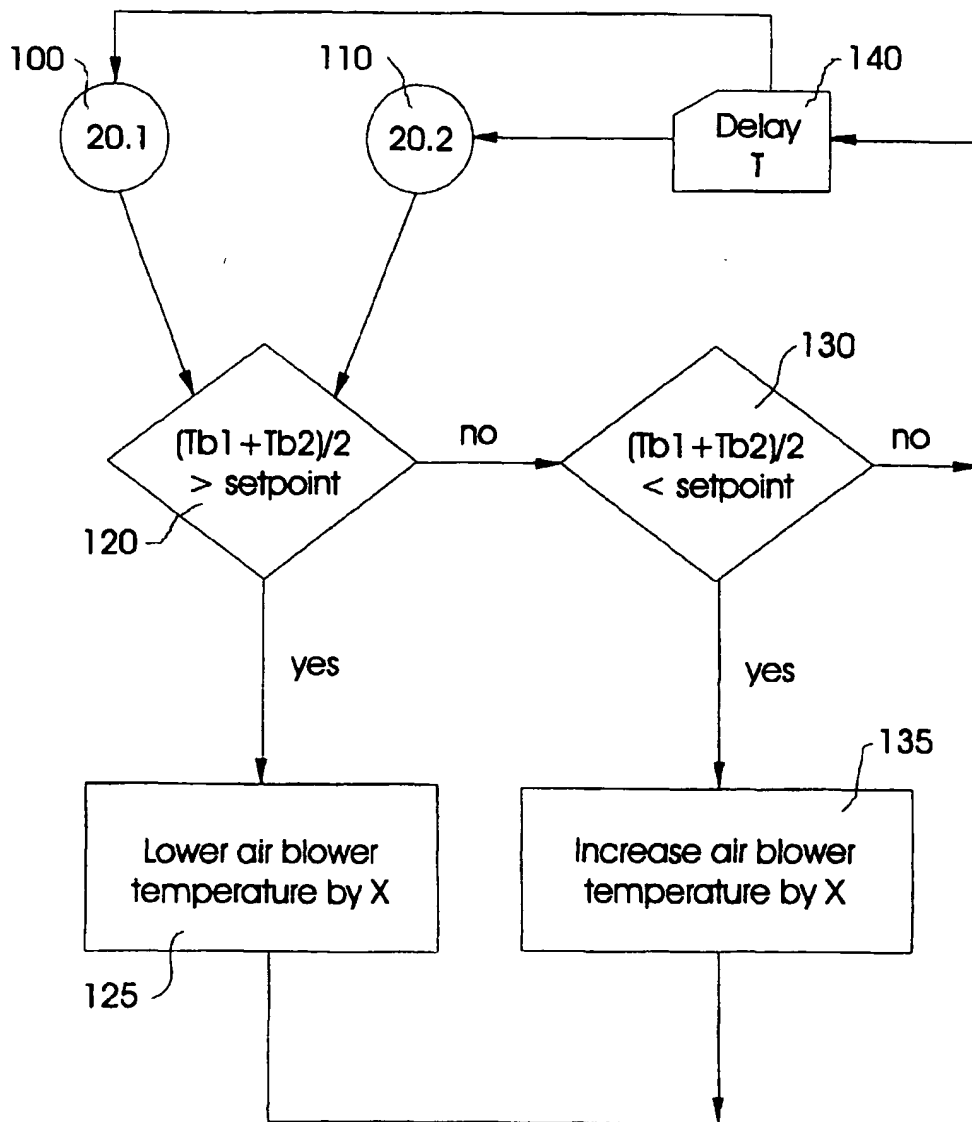
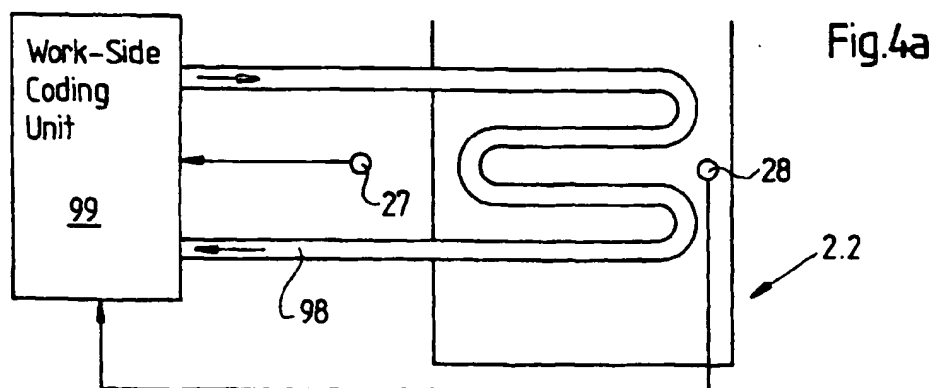
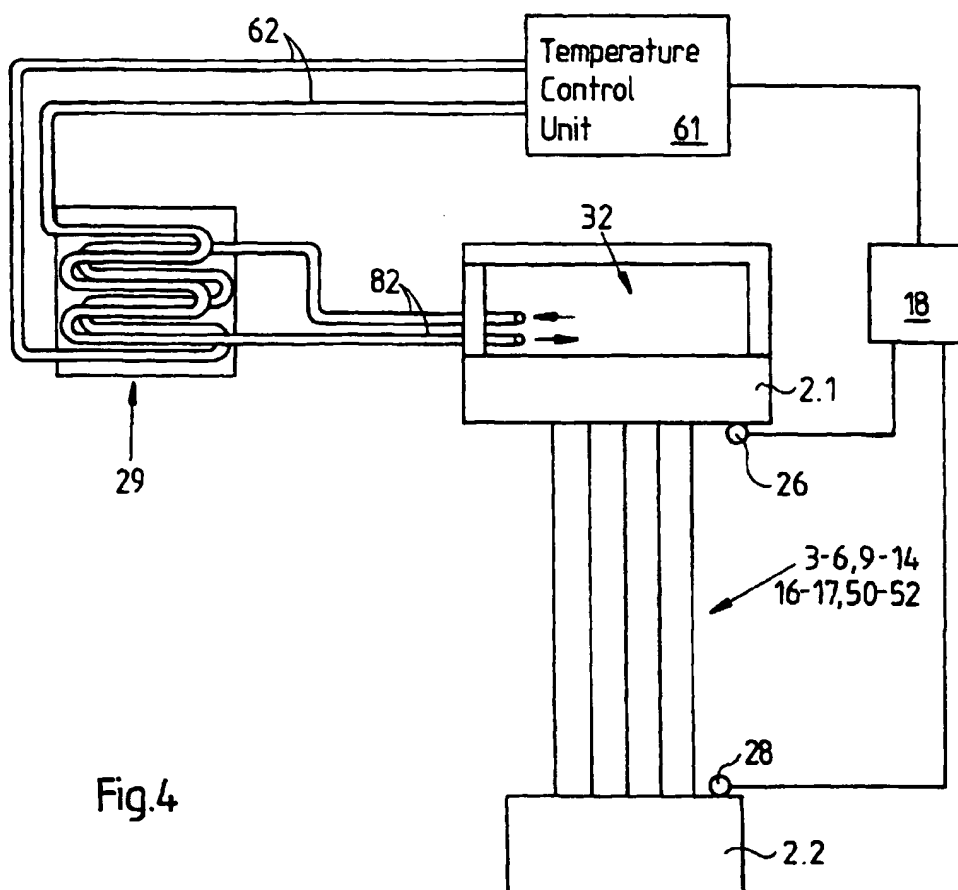


Fig.3a





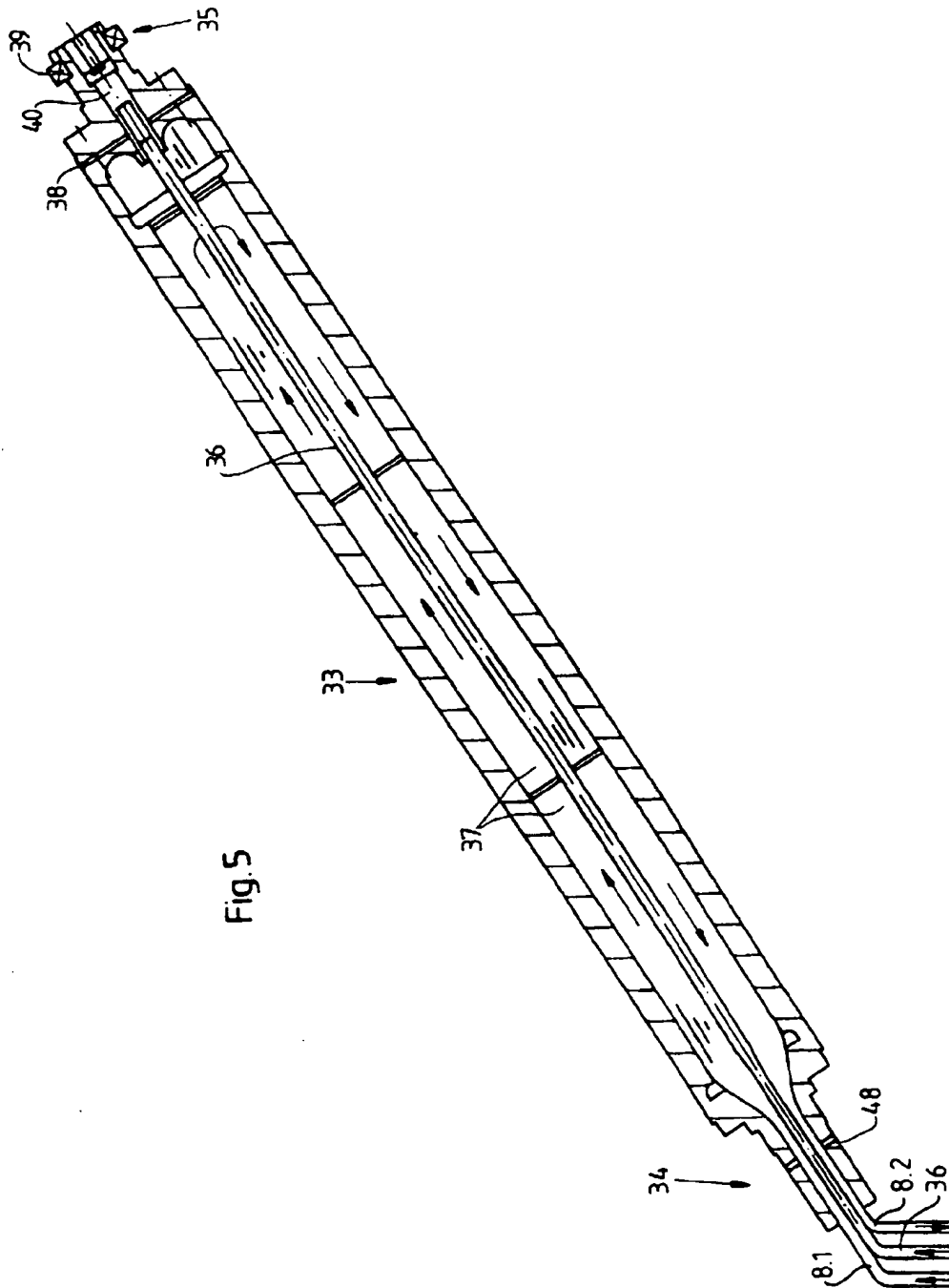


Fig. 5